NASA and the "Now" Syndrome

(NASA-TM-X-72918) NASA AND THE NOW SYNDROME (NASA) 11 p HC $3.50 CSCL 05A
N76-19006
Unclas
G3/88 18223

NASA
National
Aeronautics and
Space
Administration
Washington, D. C. 20546

NASA and the "Now" Syndrome*

When space exploration was first conceived, the primary motives were adventure, scientific investigation and national prestige. During this exciting and spectacular period we developed the technology to put satellites into orbit, to send men to the Moon and to begin exploration of the planets with automatic probes.

Our leap towards the stars was curtailed sharply by the realities of the 1970s. After decades of apathy, man had become concerned about his own planet. The wastes from his growing affluence were polluting the land, the oceans, and the atmosphere . . . mineral and energy resources were becoming scarce . . . at a time when adequate communications were paramount, he faced a crisis in communication . . . his cities were deteriorating from unwise management and were battered by floods, storms and earthquakes . . . overpopulation and food shortages threatened famine for millions.

It was inevitable that the technologies fostered by our venture into space would be arrayed against these myriad problems. Today, our space programs are heavily oriented in the "problem-solving" direction, and have produced

** From an address by Dr. James C. Fletcher, Administrator, National Aeronautics and Space Administration, delivered at the National Academy of Engineering in Washington, D. C., November 1975.*

notable accomplishments. Meteorological satellites are adding a new dimension to weather forecasting and storm warning . . . communications satellites will soon carry the majority of the world's radio, telephone, television and data transmissions . . . navigation and traffic control for land, sea and air increasingly rely on space systems . . . resources satellites help us to manage our farmlands and natural resources; help us to locate new sources of water, minerals and energy; aid us in urban planning and keep a watchful eye on the inroads of pollution. Within a few years, the reusable Space Shuttle will add man's flexibility to the near-Earth space environment and also open the way to the manufacturing and processing of new materials that cannot be duplicated on Earth.

These programs all have a common denominator: they are all space programs structured to provide a direct service to mankind. Their value is unquestioned, and they should and will be expanded. The very success of these and our other space programs, however, has whetted the appetite of the general public. Space technology has become a poultice for the physical and social ills of modern society. The often repeated question—If we can send men to the Moon, why can't we do this or that?—has brought the space program down to Earth in search of . . . new energy sources . . . synthetic fuels . . . better engine design . . . new methods of mass transportation . . . environmental protection . . . and many other endeavors of a strictly terrestrial nature.

There is nothing wrong with this per se. Wherever and whenever space technology can help improve the quality and security of life beneath our atmosphere, it should be applied wholeheartedly and vigorously.

But in concentrating on the "now" problems we are forced to ask questions about the future: are we losing sight of "the dream?" As one

Congressman expressed it. Are we sacrificing our destiny in order to satisfy our desire for immediacy in everything?

The old saying that sometimes you can't see the forest because of all the trees certainly applies to our exploration of space. We should not overlook the hidden values—the vast potential—of our national space program. Unfortunately, there are few things harder to understand—and to pay for willingly—than a *potential*. Yet we have many classic examples of the results of such ventures. One of the greatest is the voyage of Charles Darwin, made more than a century ago.

Prior to Darwin's scientific expedition to the Pacific, thousands of ships had sailed its waters, and its geography was well known. Then Darwin made his journey. He did not restrict himself to what other men had seen, but looked deeper into the nature of this new area. What Darwin brought back from the Pacific with him uprooted convictions and beliefs, triggered off a wave of controversy that has still not subsided, and created the basis for dozens of sciences and research efforts. You couldn't see, touch, feel, weigh or otherwise measure the "theory of evolution."

Like Darwin, we have set sail upon an ocean, the cosmic sea of the Universe. There can be no turning back. To do so could well prove to be a guarantee of extinction. When a nation, or a race or a planet turns its back on the future, to concentrate on the present, it cannot see what lies ahead. It can neither plan nor prepare for the future, and thus discards the vital opportunity for determining its evolutionary heritage and perhaps its very survival.

Our attempts to explore the seas of space have already proven to be of incalculable value. Yet, there is a warning to be sounded that we might be staring too hard in one direction. We must be careful not to upset the balance between the realities of today and the promises

of tomorrow. The grave problems that confront our times should not force us to hang a price tag on everything we do and then haggle over the prices as though we were shopping in some ancient eastern bazaar. The danger of this mercenary approach is that we may lose sight of the incalculable rewards beyond the innermost fringe of our space goals.

In writing the timetable for the future, we cannot allow ourselves to become shortsighted. It was narrow vision that prompted the Vikings to overlook the potential of America five hundred years before Columbus ever showed up. And history, as we know, passed by the Vikings.

Dwindling resources and contamination of the planet Earth's environment are more recent examples of man's tunnel vision. And the blinders are still on. Our answer to the looming energy crisis is apathy. We should have been concerned about energy a quarter of a century ago. Instead, we recklessly plundered a leftover treasure from the Sun as if it was unlimited. Now, we are about to pay the consequences.

The same analogy holds true for space exploration. Unless we proceed forward with the same adventuresome spirit that characterized the earlier years of the Space Age, tomorrow's dreams will become tomorrow's problems.

Now, I would like to change direction for a few moments and discuss some of our future options in space. Let me begin close to home.

With uranium and fossil fuels heading towards depletion, we should be giving serious attention to solar energy as a solution to our long-range energy needs. Terrestrial solar energy will find its place in applying these needs but it could be more useful as an energy source if solar energy should be collected constantly and in large amounts. This is difficult to do on Earth because of the problems of clouds, the day-night cycle, and the requirement of vast areas of open, uninhabited land for terrestrial solar collectors.

No such restrictions are found in space. Large solar arrays could be positioned so that they are continually hovering in the sunlight above the same points on the Earth's surface. From these vantage points, they could beam solar energy in the form of microwaves to collecting stations below.

Space systems may not be the total answer to our solar energy needs, but they certainly represent one of the directions we should be looking in. What is important is that we begin to consider other alternatives. If we had placed the same emphasis years ago on ways to utilize solar energy as we have put into the development of a nuclear generating capacity, we might already be well along the road to solving the energy shortage.

We should begin to think seriously about putting up a permanent, manned space station, an engineering feat well within the limits of current technology. An orbiting space base crewed by scientists, engineers and technicians from all over the world would prove invaluable for studying the Sun, the stars and the near-Earth environment. It would have an unmatched capability for terrestrial weather, resources and environmental surveillance. It would offer a weightless laboratory for developing new materials and products impossible to duplicate on Earth. It could serve as an economical waystation for extended exploration of the Moon, for establishing lunar bases, and for manned and unmanned voyages to the other planets of the solar system.

We should not ignore new concepts such as the space colony recently proposed by Professor Gerard O'Neill. The wheel-shaped habitat would house up to 10,000 people along with shops, schools, light industry and a self-contained agriculture system. The principal industries would be the manufacture of more habitats and the construction of solar energy collectors that would be placed in orbit near the

Earth to beam down cheap energy. Solar energy also would power the space colony. Heavy industry would be conducted outside the habitat to make use of the weightlessness and vacuum of space.

After completion of the first habitat, larger colonies could be constructed, some orbiting farther from Earth. The material of the asteroids, for instance, would be sufficient for the construction of colonies with a total land area thousands of times greater than all of Earth's continents.

We should also expand our exploration of the planets. From these undisturbed worlds we can gain a better understanding of the forces that shape our own planet and its evolution. It is not at all unlikely that someday we may look upon some of these distant worlds and their satellites as havens from a ravaged and teeming Earth—long-range alternatives to the orbiting space colony.

We have already completed flyby missions to Mercury, Venus, Mars and Jupiter. Soon, one of our Jupiter spaceships, Pioneer 11, will give us our first close-up look at ringed Saturn. Next summer, Viking spaceships will land on the surface of Mars to search for evidence of life on that planet. We are considering a probe to distant Uranus in the 1979 time period. But what about Neptune, Pluto and beyond? And should we consider the stars?

Why not!! Less than two decades ago, we were proudly pointing to a grapefruit-sized satellite in orbit. Today, we are sending robot spacecraft to explore the surface of other worlds. A proposal by the British Interplanetary Society for an unmanned mission to the nearest star, Alpha Centauri, has been received with more than casual interest. Such a mission would require a new type of propulsion system and years of planning.

But why bother about Alpha Centauri and points beyond when we have not completed the

exploration of our own solar system? For the best of reasons. Although the discoveries we shall make on our neighboring worlds will revolutionize our knowledge of the Universe, and probably transform human society, it is unlikely that we will find intelligent life on the other planets of our Sun. Yet, it is likely we would find it among the stars of the galaxy, and that is reason enough to initiate the quest.

Long before interstellar probes become feasible, however, we could engage in interstellar communication. We should begin to listen to other civilizations in the galaxy. It must be full of voices, calling from star to star in a myriad of tongues. Though we are separated from this cosmic conversation by light years, we can certainly listen ten million times further than we can travel. Some may call this nonsense, that on the scale of galactic communications, we have just reached the level of smoke signals and semaphores. No doubt this is true. The chances of success could be close to zero for our generation. But if we don't try, the chances are exactly zero. It is hard to imagine anything more important than making contact with another intelligent race. It could be the most significant achievement of this millenium, perhaps the key to our survival as a species.

Having speculated on some of the dreams of space exploration, let's come back to Earth and examine the realities.

I might begin by posing a couple of questions.

Is NASA, itself, becoming shortsighted?

Isn't the Agency's pre-occupation with short-range projects a contradiction of its publicly espoused goals?

Granted, NASA's present actions seem to speak louder than its words. Our expenditures are weighted heavily in favor of contemporary needs. This course, however, does not presume an abandonment of tomorrow's goals or a lack of the vision and imagination that molded NASA

into probably the most forward looking agency of government. Rather, it represents an accommodation with current constraints.

Let me explain. The most difficult task facing an administrator today is to maintain a future perspective in the face of growing consumer and public demands for solutions to today's problems. In planning long-range objectives, he must take into account certain time horizons.

The public, for example, is "now" oriented. Studies—and I might add, past experience—have shown that the average person pays lip service to the kind of world he wants for his grandchildren. He is interested in what affects him now, not his descendants. He can easily translate the concept of meteorological satellites into his everyday experience. Thus, he is ready to bear the costs of developing the technology, the boosters and the satellites themselves, *not* because he believes in space activities but because he stands a far better chance of not having that ball game rained out when the forecast was for sunny skies. Selling him on the idea of financing a $100 billion space colony for the 1990s must be viewed by him in the same context as convincing an Eskimo that he needs a refrigerator for his igloo.

The attitude of the public leads to a second time horizon—the political term of office. A legislator must be responsive to the demands of his constituents. As a result, he seldom is afforded the luxury of thinking beyond his present term and thereby perpetuates the "now" philosophy.

A third time horizon evolves quite naturally from the other two. This is the budget cycle. The Office of Management and Budget, which controls the government's pursestrings, rarely plans beyond one or two years at a time. It is responsive to the dictates of political and economic pressures which more often than not reflect only the day-to-day needs of society.

NASA's Space Shuttle program is an excellent example of the effects of year-to-year budget cycles. The program has never been funded in its entirety but has been piecemealed together out of the Agency's overall yearly budget at the expense of many promising long-range programs. Yet if NASA did not proceed with the development of the Shuttle the Nation would be without a major new space program for the 1980s.

A final time horizon is the active professional career of the individual. The leaders of any institution are motivated by the same "now" syndrome that affects the average citizen. They want to see the fruition of their plans and dreams, and they obviously tend to favor projects whose culmination lies within their own career spans — or at least within their lifetimes. This temptation is doubly strong in respect to an agency such as NASA whose programs are sometimes measured in decades.

The restrictive elements I have just described should not be construed as excuses for NASA's lowered sights. They are causes — emotional, political and economic facts of life — that in whole or part are holding back our outward flight into the future.

We cannot afford to let these obstacles deter us from our ultimate goals. We must somehow keep the dreams of space exploration alive, for in the long run they will prove to be of far more importance to the human race than the attainment of immediate material benefits, just as the effects of Copernican astronomy or Darwin's theory of evolution far outweighed their immediate practical results.

Space offers us an alternative for the future. Our race can squander its potential and continue our unchecked momentum down the slopes of time towards the shore of the primeval sea to join the great reptiles and nature's other unsuccessful experiments. Or we can accept

the challenge of the great spaces between the worlds and establish our citadels among the stars

The choice is, as the historian H G Wells once said "The Universe or nothing"

GPO 900-016